
Planning complex sites

Planning a multi-floor coverage area

This section shows you how to plan for coverage on multiple adjacent floors. Consider this procedure if the coverage area is on more than one floor and the floors are adjacent to each other.

Consider the coverage of a cell through the floor when planning a multi-floor building.

Measure the signal strength when you are directly above or below the cell center of an adjacent floor. If you read a signal strength greater than -45 dBm, plan the building using the multi-floor coverage area methods. If it is less than -45 dBm, you can plan the floors independently.

Note: When planning a multi-floor building do not stack the cell centers from floor to floor.

Multi-floor coverage is important in the following places:

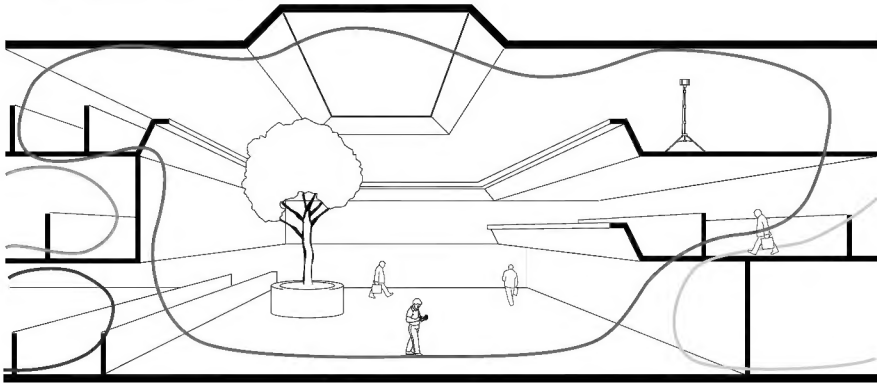
- atriums
- high-rise buildings, or buildings where all the floors are the same shape
- buildings where the floors are not the same shape

Atriums

Cells in an atrium are usually larger than the cells of the rest of the building (see Figure 25). Although there are no precise steps to follow when planning an atrium, consider these points:

- Plan atriums to their full height.
- Do not plan an atrium floor by floor but as one full size room.
- Place cell centers within an atrium only when they are intended to cover the atrium.
- Do not put cell centers in an atrium if they are intended to serve adjacent areas. To serve adjacent areas put the cell centers in these areas.
- If cell centers in adjacent dense areas serve one floor of an atrium, check the coverage of the cell on all of the floors that meet with the atrium.
- If the atrium is large enough (more than one third the size of the building or more than one cell in size), consider planning the atrium first, as you would plan outdoor coverage.

Figure 25: Covering an atrium



High-rise buildings

This section describes the steps in planning a building from the top floor down. When planning multiple adjacent floors in a high-rise building, consider the radio signals passing through the adjacent floors above and below.

Left-right-skip

The left-right-skip technique keeps the cell centers from being stacked on top of each other. A cell center has coverage on its own floor as well as on the

floors above and below it. You plan a high-rise building in sets of three floors as shown in Figure 26.

1. Using the CDT, plan the cell centers on one floor using the techniques described in “Covering a single floor indoor area” on page 29. When you finish this step, you should know how many cell centers are required to cover one floor.

This floor is the “left” floor. The floor below the left floor is the “right” floor.

2. On the floor plan, plan the right floor with the same number of cells as there are for the left floor. Stagger the right cell centers with respect to the cells on the left floor, as shown in Figure 26. Use the CDT to verify the coverage.

The floor below the right floor is the “skip” floor.

3. Cover the skip floor from cell centers above on the right floor and from cell centers below on the left floor.

Note: Do not install cell centers on the skip floor.

4. With the CDT at each of the cell centers on the right floor, find the cell edges on the skip floor.

The floor below the skip floor is another left floor. If the floors of the high-rise are built the same, the cell centers of this left floor are the same as the first left floor.

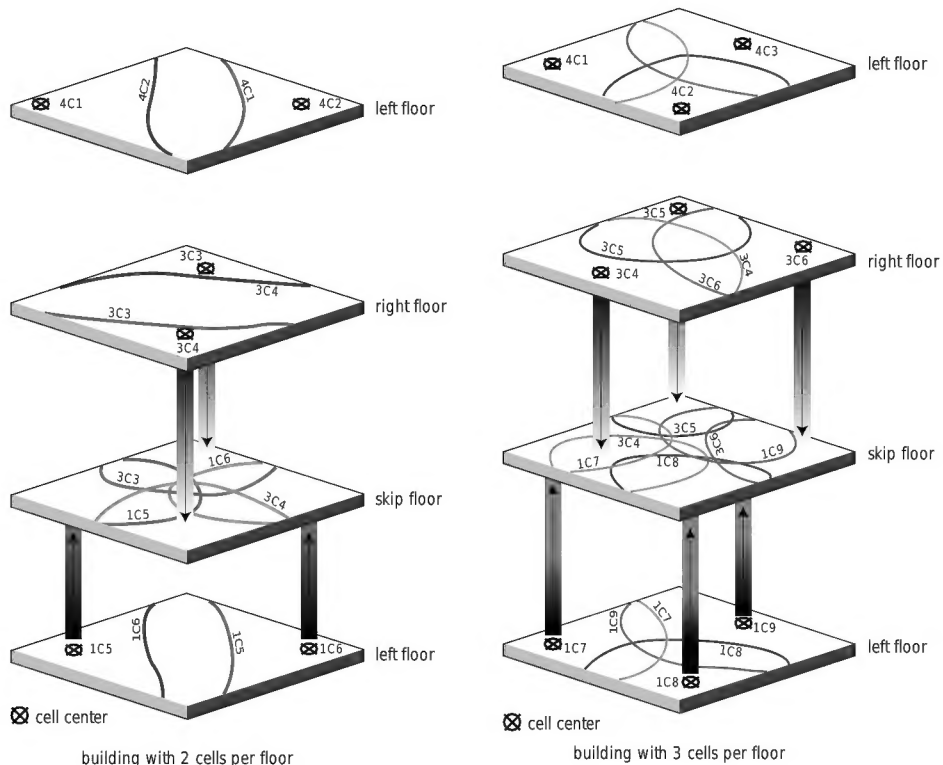
5. With the CDT at each of the cell centers on the second left floor, determine the coverage on this floor and on the skip floor above. Confirm that you have completely covered all of the floors.
6. Continue this procedure for the remaining floors.

Note: The skip floor should not be the first or the last floor of the coverage area. As shown in Figure 26, one half of the skip floor is covered by the cells on the floor above and the other half is covered by the cells on the floor below.

If the number of adjacent floors is a multiple of three, use the sequence right-skip-left.

Figure 26 shows examples for two different buildings, requiring two and three cell centers for each left and right floor.

Figure 26: Left-right-skip examples



Note: Areas of high portable density and floors that are constructed differently can cause gaps in the coverage. These areas should be treated as special cases. Do not use the left-right-skip technique.

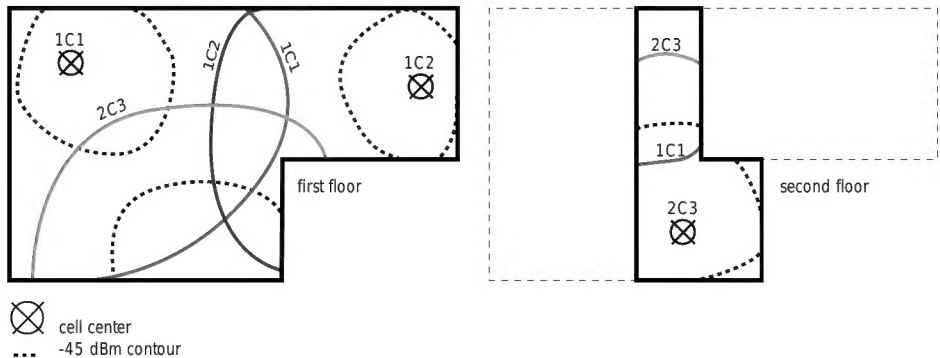
Differing floor areas

This section shows what you need to consider when planning a building with floors of different shapes.

Ensuring that cells are not too close

Links between Base Stations and a portable could be held too long as the user moves between cells if the -45 dBm cell contours overlap. Keep areas of overlap to a minimum, as shown in Figure 27.

Figure 27: Cell overlap



For each cell center:

1. Using the CDT, find the -45 dBm contour on the floor of the cell center and on the floors above and below. If these contours overlap an atrium, find the contours on all of the floors that are adjacent to the atrium.
2. Check that the -45 dBm contours of all the cells do not overlap each other.

Note: The two cells do not have to be on the same floor. An overlap of the -45 dBm contour can occur between two cell centers that are two floors away.

Ensuring that cell centers are not too far apart

All of the coverage areas must be within the cell boundary contour. For each cell center, use the CDT to check that all of the areas requiring coverage are within the cell boundary contour.

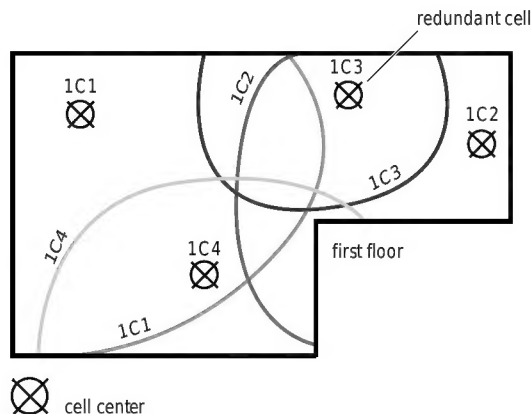
Note: The cell center does not have to be on the same floor or an adjacent floor of the area that it is covering, but the signal strength of the coverage area must be greater than the cell boundary value.

Checking for redundant cells

When you plan a site with differing floor areas you may have planned redundant cells.

Check the coverage area of each cell and verify that there is at least one area that each cell serves that is not served by another cell. If all of a cell is served by other cells, and this cell is not required for high portable density, remove the cell (see Figure 28).

Figure 28: Locating redundant cells



Planning an area of high portable density

Note: Only use the high portable density procedure in this section if instructed to do so from Table 8 on page 38.

When you plan an area of high portable density, your first objective is to keep the anticipated number of portables for each cell center less than or equal to 44 if the users have desk telephones in their offices and 23 if the users do not have desk telephones.

Your second objective is to ensure that each link connects to the closest cell center by confirming that the -45 dBm contours of different cells do not overlap (they may do so marginally if necessary).

Only replan the areas of the site that have a high portable density. Measure the -45 dBm contour the same way you measure the cell boundary value, but do not use the tone (see “Using the CDT to determine cell boundaries” on page 19). If you set the tone to change at -45 dBm, the tone will not reset to let you make several measurements. Keep the setting for the tone at the cell boundary value and use the display for measuring the -45 dBm contour.

Planning an area of high portable density

1. Count the number of users in the area of high portable density. Include any floors above and below as well (if applicable).
2. Divide the number of users by 44 or 23. Round up the result to the next whole number. This figure is the number of cells you need to plan in the high portable density area.
3. Measure with the CDT the cell boundary contour and the -45 dBm contour of one cell in the high portable density area. If the building requires coverage on adjacent floors, include these floors as well.
4. Estimate the location of the cell centers where the -45 dBm contours of the cells will not overlap and the cell boundary will cover the required area. Use the number of cells as calculated in step 2.
5. With the CDT, verify and record the cell centers you planned on paper in step 4. You must verify the -45 dBm contour and the cell boundary contour. Include any adjacent floors above or below as required.

If there are gaps in the coverage or the -45 dBm contours overlap, repeat step 4.

6. Calculate the anticipated number of portables per cell using Table 8 on page 38. If any of the cells has an anticipated number of portables per cell that is more than 44 or 23, repeat step 4.

If you have too many portables in an area, inform your customer.

Note 1: If the -45 dBm contour lines overlap, users may hear long mutes, voice interruptions, crackling speech, or they may drop calls.

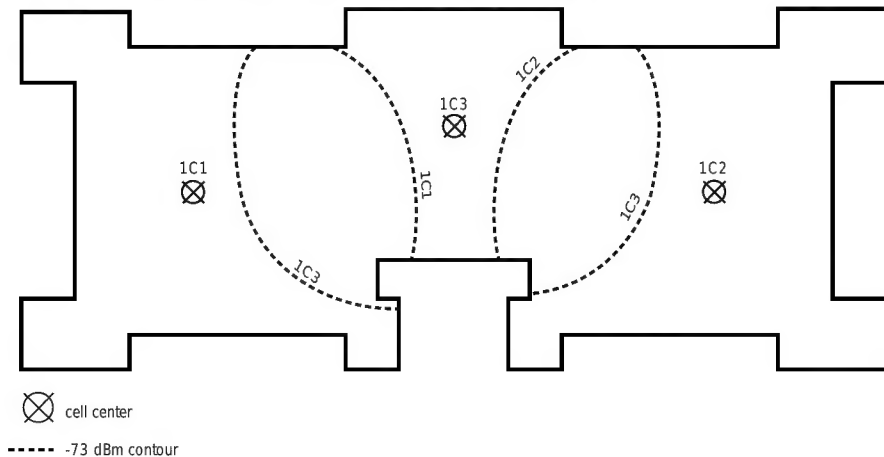
Note 2: You do not need to verify that the offices and office areas in a high portable density system are at -70 dBm or better because all links will be greater than -70 dBm.

Example of a high portable density area

Children's Hospital wants to provide a wireless system for its nurses. It wants to provide up to 200 portables to be covered anywhere on the floor. The sales group recommends the Meridian Companion system.

You survey the site as if it is an area that is not high portable density and find that the site can be covered with three cells, as shown in Figure 29.

Figure 29: Example of standard cell planning

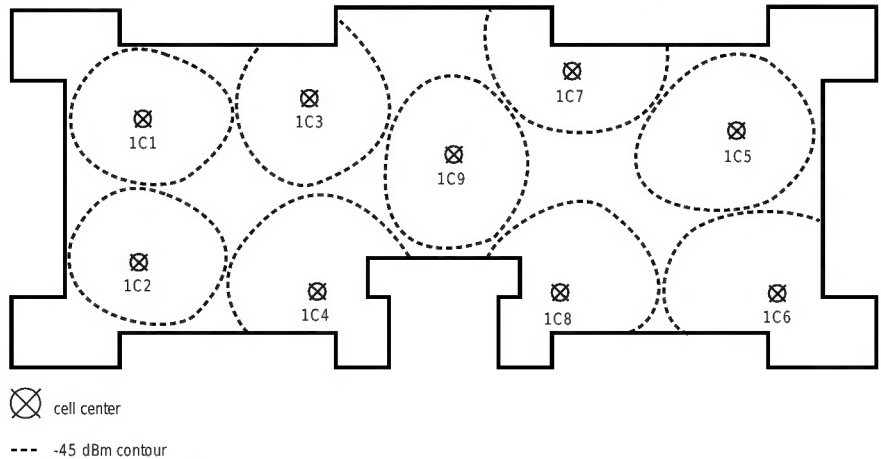


None of the 200 users have an office on the floor, so you compute the anticipated portable count to be 67 ($200 \div 3$) users for each cell. Using Table 8 on page 38, you find that the anticipated number of portables per cell count exceeds 23, therefore you must plan the floor for high portable density.

The number of users in the high portable density area is 200, so you calculate the required number of cells to be nine ($200 \div 23$).

On the floor plan you estimate nine locations for the cell centers to get complete coverage and for the -45 dBm contours not to overlap (see Figure 30).

Figure 30: Example of high portable density planning



With the CDT, you verify the coverage with the cell boundary contour and the -45 dBm contours.

The anticipated portable count for each cell is now 22.2 ($200 \div 9$). Using Table 8 on page 38 you find that each cell needs four Base Stations. Therefore, the total site requires 36 Base Stations.

Planning where there is an existing Companion system

Adjacent systems

If you are planning a system beside another system, note whether the following are valid:

- there is no common coverage area between the two systems
- there is little possibility that a user from one system will want service from the coverage area of the other system

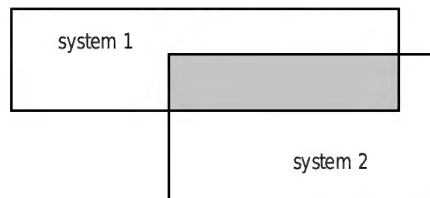
If these points are valid, you can plan the sites independently of each other, but you must keep the cell centers between the two systems at least 23 ft (7 m) apart.

Overlapping systems

Two or more systems that have cells that serve a common area, as shown in Figure 31, are overlapping systems.

Note: Avoid overlapping one system with another whenever possible.

Figure 31: Overlapping systems



Different systems covering the same area prevent links from being established, degrade voice quality, induce long mutes, and drop calls for all systems involved. This situation progressively degenerates as the number of links between the systems increases.

Keep the Base Stations between these systems at least 23 ft (7 m) apart. This distance decreases the number of occurrences of poor voice quality and long mutes, but does not eliminate them. The customer may complain of poor quality service.

Planning multiple systems

This section shows you how to plan multiple Companion systems for the same site. If the number of required portables or the number of required cells is more than one system can serve, consider using this procedure. To determine the limits of your Companion system, refer to the appropriate system documentation.

Note: Before using the procedures in this section, you should understand the basics of site planning (see “Site planning basics” on page 21).

For a site with multiple systems, you need to consider the following:

- Do you plan for all of the systems to cover all the area, part of the area or separate areas?
- On an incoming call, do all the systems search for the portable or does just one system search for the portable?
- Do all of the systems use the same or different system names?

Table 12 and the section “Parameters affecting multiple systems” help you to decide which multiple system case applies to your site.

Parameters affecting multiple systems

Number of portables The number of portables is either high or low. If the number of portables is greater than the maximum number that you can register to one system, the number of portables is high.

Number of cells The number of cells is either high or low. If the number of cells is greater than the maximum number for your system, the number of cells is high.

Mobility of the users The mobility of the users is either restricted or roaming:

- a roaming user can make or receive calls in any cell
- restricted mobility keeps each user confined to one cell

Note: Restricted mobility is chosen by the customer, that is, the system still permits roaming.

Table 12: Planning multiple systems

Case	Portable count	Cell count	Mobility	Characteristics
restricted mobility	does not matter	does not matter	restricted	• no overlap • one system searches • different system names
low portable count/ high cell count	low	high	roaming	• no overlap • all systems search • same system names
high portable count/ low cell count	high	low	roaming	• 100% overlap¹ • one system searches • different system names
high portable count/ high cell count	high	high	partial roaming	• partial overlap • one system searches • different system names

1. Avoid 100% overlap where possible. Study user mobility patterns and minimize the amount of system overlap.

System names

For CT2Plus systems, use different system names. For outgoing calls, users need to know where each system name is used. Portables in CT2Plus systems must be set on “scan all systems” to receive incoming calls. This is set by the installer.

If the PCI systems have different names the users must know the system names to make or receive any calls. The systems may all use the same name if there are no multi-system users.

Guidelines

Plan a multiple system for a single site with the following guidelines:

- Use the smallest number of systems required to serve the site.

- Learn where the users need service. If all of the users do not need to go everywhere, the audio quality of the service can be maximized.
- Avoid overlapping systems. If you must overlap systems, minimize the number of overlapping cells.
- Keep all users in the same area on the same system. If users in the same area must be on different systems, keep most of them on one system. This strategy minimizes the required number of Base Stations and maximizes audio quality.
- Where possible, group the cells of each system together on the floor plan. For example, system A serves the east side of a site and system B serves the west side.
- To determine the anticipated number of portables per cell, use the total number of cells of the systems to which a user is registered.

Planning for multiple systems

1. Gather site information. Include the system recommended by the sales group.
2. Survey the site as if it is a single system. See either “Covering a single floor indoor area” on page 29 or “Planning a multi-floor coverage area” on page 57, as required for your site.
3. Do traffic calculations for the entire site as if it is a single system to determine the number of Base Stations for each cell (this is an estimate), then add the number of Base Stations for the entire site (see “Determining the number of Base Stations per cell” on page 37).
4. Use the appropriate Companion installation documentation to determine the number of systems required to serve the site based on the users’ movements.
5. Divide the site into the number of required systems based on the users’ movements.
6. Recalculate the number of Base Stations required for each cell for each system (see “Determining the number of Base Stations per cell” on page 37). If required, include the number of additional users and Base Stations a system can support.

7. Review the preliminary system proposal recommended by the sales group with the customer. Adjust the proposal according to customer requirements.
8. Finish planning the site as shown in “Site planning basics” on page 21.

Examples of four types of multiple systems

Restricted mobility problem

The Apex Department Store has 300 employees working in 45 departments on the store floor. Each employee works in only one of the departments. The store's inventory is so large that the employees climb 27 ft (8 m) high shelving on lateral moving ladders to reach the merchandise, which makes it impossible for the employees to use desk telephones.

Employees constantly answer a speaker broadcast system to know what merchandise to get. If the employees on the ladders do not understand the message, they climb down the ladder and walk to the nearest phone to find out what was said. Outside calls are also discouraged because of the time spent locating an available phone.

Twelve employees work the front counter taking orders from customers. These employees often wait for their turn to call out the orders on the speaker broadcast system.

Your customer wants to give each of the store's 300 employees who climb the ladders a portable telephone and remove the speaker broadcast system. The sales group recommends a Companion (C200) system.

Solution

Since none of the users have an office with a desk, you plan the coverage area using -73 dBm. You survey the site and find that the store requires 18 cells for full coverage. The mobility of the users is more vertical than it is horizontal. Except in a few cases, one cell covers entire departments. This means the users' work restricts the mobility of each user to one of the cells.

You devise Table 13 based on “Determining the number of Base Stations per cell” on page 37.

Table 13: Anticipated number of portables per cell for restricted mobility

Cell	Anticipated number of portables per cell
1C1	22
1C2	14
1C3	7
1C4	21
1C5	6
1C6	23
1C7	19
1C8	18
1C9	15
1C10	13
1C11	15
1C12	21
1C13	20
1C14	22
1C15	12
1C16	16
1C17	19
1C18	17

Note: The following assumption is made for cases of restricted mobility:

Total number of users with an office = Users inside the cell with an office

You calculate the number of Base Stations required for each cell in Table 14, using Table 8 on page 38.

Table 14: Required Base Stations for restricted mobility

Cell	Base Stations
1C1	4
1C2	3
1C3	2
1C4	4
1C5	2
1C6	4
1C7	4
1C8	4
1C9	3
1C10	3
1C11	3
1C12	4
1C13	4
1C14	4
1C15	3
1C16	4
1C17	4
1C18	4

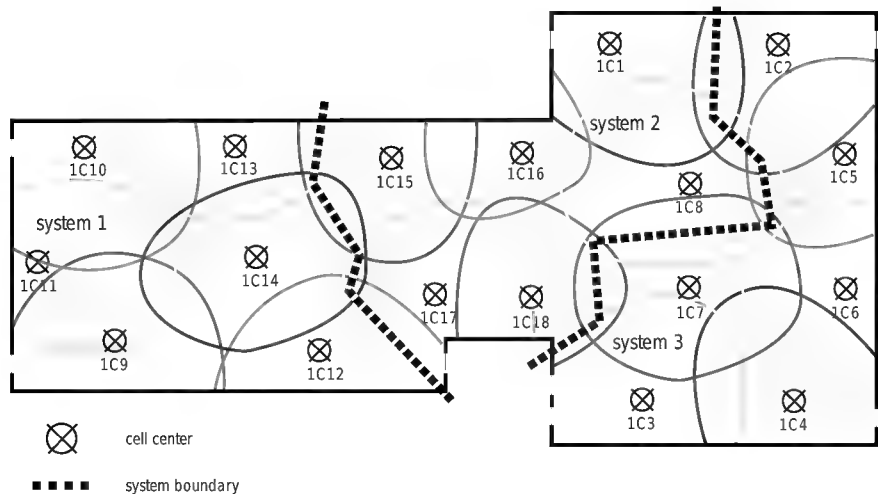
Apex Department Store needs 63 Base Stations.

Using the appropriate table in your Companion installation documentation, you determine that one Companion system cannot serve 300 users with 63 Base Stations. You require a minimum of three systems where:

- system 1 covers cells 1C9, 1C10, 1C11, 1C12, 1C13 and 1C14, with 89 users and 19 Base Stations
- system 2 covers cells 1C1, 1C8, 1C15, 1C16, 1C17 and 1C18, with 101 users and 22 Base Stations
- system 3 covers cells 1C2, 1C3, 1C4, 1C5, 1C6 and 1C7 with 110 users and 22 Base Stations

Figure 32 shows the floor plan of the Apex Department Store with the multiple systems.

Figure 32: Restricted mobility example



Apex Department Store's coverage requirements

- none of the systems overlap
- each cell uses only one system
- all of the users in the same cell are on the same system
- each call that comes into the Apex Department Store searches only for a portable on one of the three systems

- all three systems use different system names
- three systems is the smallest number of systems required to serve the site
- most users work within the area of only one of the cells
- the cells of each system are grouped together on the floor plan

Low portable count/high cell count problem

Amusement Park consists of an office complex and ten pavilions. There are 60 customer relations, security and maintenance personnel. These employees spend most of their time moving about the park and spend little time in the office complex; however, they must be in contact with the office personnel.

The sales group recommends a Companion (C200) system.

Solution

You survey the site. You use the CDT set at -73 dBm in all the pavilions. You assure coverage in the office complex at -70 dBm. As a result, you calculate a need for 177 cells. You do the traffic calculations with most of the personnel being in the pavilions. You determine that the park needs 187 Base Stations.

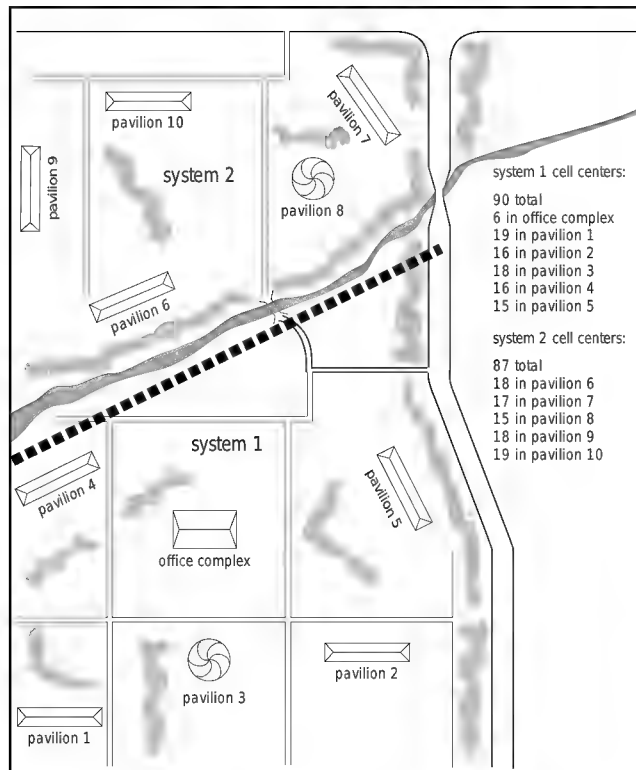
Using the appropriate table in your Companion installation documentation, you find that one Companion system cannot serve 177 cells with 187 Base Stations and 60 portables. You require a minimum of two systems where

- system 1 covers 90 cells, 1C1 through 1C90, with 60 registered users and 96 Base Stations
- system 2 covers 87 cells, 1C91 through 2C177, with 60 registered users and 91 Base Stations

All of the users can go anywhere in the office complex or the pavilions because the installer registers all of the users to both systems.

Figure 33 shows the coverage for a site with a small number of portables and a large number of cells.

Figure 33: Low portable count/high cell count example



Park's coverage requirements

- none of the systems overlap
- each cell uses only one system
- each call that comes into the park searches for the portable on both systems
- both systems use the same system name
- two systems is the smallest number of systems required to serve the site
- all of the users need to go everywhere, therefore all of the users are registered to both systems
- the cells of each system are grouped together on the floor plan

High portable count/low cell count problem

Life Bank has a 28-story building with 450 employees. Often you cannot reach these employees because they are looking around the building for each other. Over half of the phone calls result in messages. One third of the users have pagers and most of the answering machine messages refer to calling again on the pager number. This rarely happens because the caller simply leaves a voice message. There have been reports of pagers not working in some parts of the building.

The sales group's investigation of user mobility shows that most people, when not in their offices, are usually on the floor of their office or are just one floor up or down. About one quarter of the users use the cafeteria and lounge on the top floor throughout the day for breaks, informal meetings and lunch.

The sales group recommends a Meridian Companion system on their existing Meridian product line. All of the users have a desk phone.

In the Life Bank building, the ground floor is Floor 1 and the thirteenth floor is Floor 13.

Solution

The whole Life Bank building is office space, so you survey one floor at -70 dBm and determine that the floor needs two cells. Using the left-right-skip technique (see "Left-right-skip" on page 58), you find that the building needs 38 cells. From the traffic calculations, you determine that the building needs 88 Base Stations.

Using the appropriate table in your Companion installation documentation, you find that one Meridian Companion system cannot serve 88 Base Stations and 450 portables. The site requires three Meridian Companion systems as follows:

- System 1, as shown in Table 15, needs 22 cells. Twenty cells, 28C1 through 14C20, cover the fourteenth through the twenty-eighth floors, for 113 users. Two more cells, 12C39 and 12C40, allow system 1 users to go down a floor. System 1 needs 36 Base Stations.

Table 15: Example traffic table (System 1: high portable count/low cell count)

Cell	Number of offices	Number of offices x 0.7	Users from another cell	Users without an office	Anticipated number of portables	Base Stations
28C1	1	0.7	1.6	0	2.3	1
28C2	5	3.5	1.5	0	5.0	2
26C3	12	8.4	1.4	0	9.8	2
26C4	5	3.5	1.5	0	5.0	2
25C5	7	4.9	1.5	0	6.4	2
25C6	2	1.4	1.6	0	3.0	1
23C7	26	18	1.2	0	19.4	3
23C8	5	3.5	1.5	0	5.0	2
22C9	2	1.4	1.6	0	3.0	1
22C10	6	4.2	1.5	0	5.7	2
20C11	5	3.5	1.5	0	5.0	2
20C12	8	5.6	1.5	0	7.1	2
19C13	2	1.4	1.6	0	3.0	1
19C14	0	0	1.6	0	1.6	1
17C15	3	2.1	1.6	0	3.7	2
17C16	13	9.1	1.4	0	10.5	2
16C17	4	2.8	1.6	0	4.4	2
16C18	0	0	1.6	0	1.6	1
14C19	7	4.9	1.5	0	6.4	2

Table 15: Example traffic table (System 1: high portable count/low cell count) (continued)

Cell	Number of offices	Number of offices x 0.7	Users from another cell	Users without an office	Anticipated number of portables	Base Stations
14C20	0	0	1.6	0	1.6	1
12C39	0	0	1.6	0	1.6	1
12C40	0	0	1.6	0	1.6	1

- System 2, as shown in Table 16, needs 14 cells. Eight cells, 13C21 through 8C28, cover the eighth through the thirteenth floors, for 153 users. Two more cells, 6C41 and 6C42, allow system 2 users to go down a floor. Two more cells, 15C43 and 15C44, allow system 2 users to go up a floor. Two more cells, 28C45 and 28C46, allow system 2 users to be in the cafeteria and lounge. System 2 needs 35 Base Stations.

Table 16: Example traffic table (System 2: high portable count/low cell count)

Cell	Number of offices	Number of offices x 0.7	Users from another cell	Users without an office	Anticipated number of portables	Base Stations
13C21	39	27	2.6	0	29.9	4
13C22	30	21	2.8	0	23.8	3
11C23	0	0	3.5	0	3.5	2
11C24	26	18	2.9	0	21.1	3
10C25	0	0	3.5	0	3.5	2
10C26	27	19	2.9	0	21.8	3
8C27	14	9.8	3.2	0	13.0	3
8C28	17	12	3.1	0	15.0	3
6C41	0	0	3.5	0	3.5	2
6C42	0	0	3.5	0	3.5	2
15C43	0	0	3.5	0	3.5	2
15C44	0	0	3.5	0	3.5	2
28C45	0	0	3.5	0	3.5	2
28C46	0	0	3.5	0	3.5	2

- System 3, as shown in Table 17, requires 14 cells. Ten cells, 7C29 through 1C38, cover the first through the seventh floors, for 184 users. Two more cells, 9C47 and 9C48, allow system 3 users to go up a floor. Two more cells, 28C49 and 28C50, allow system 3 users to be in the cafeteria and lounge. System 3 needs 36 Base Stations.

Table 17: Example traffic table (System 3: high portable count/low cell count)

Cell	Number of offices	Number of offices x 0.7	Users from another cell	Users without an office	Anticipated number of portables	Base Stations
7C29	35	25	3.4	0	27.9	4
7C30	0	0	4.2	0	4.2	2
5C31	52	36	3.0	0	39.4	4
5C32	5	3.5	4.1	0	7.6	2
4C33	3	2.1	4.2	0	6.3	2
4C34	12	8.4	4.0	0	12.4	3
2C35	50	35	3.1	0	38.1	4
2C36	15	11	3.9	0	14.4	3
1C37	7	4.9	4.1	0	9	2
1C38	5	3.5	4.1	0	7.6	2
9C47	0	0	4.2	0	4.2	2
9C48	0	0	4.2	0	4.2	2
28C49	0	0	4.2	0	4.2	2
28C50	0	0	4.2	0	4.2	2

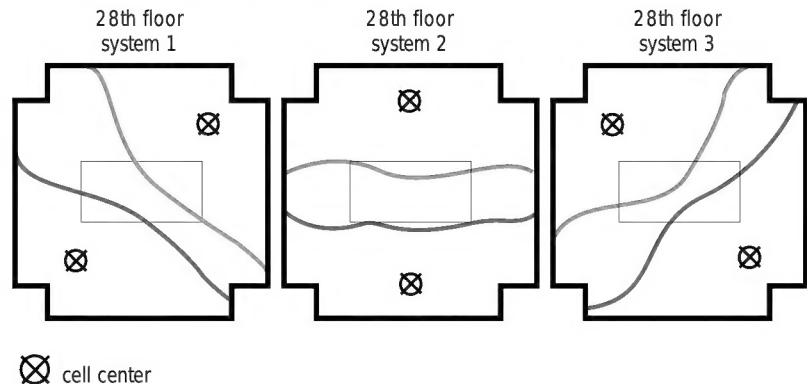
You covered every floor with one Meridian Companion system, including the skip floors where the cells on the adjacent floors above and below the skip floors are on the same Meridian Companion system. (The skip floors are floors 3, 6, 9, 12, 15, 18, 21, 24 and 27.)

Because of some overlapping of the coverage area served by each Meridian Companion system, the final requirements are 107 Base Stations and 48 cells.

Life Bank coverage requirements

- the coverage areas served by the three systems overlap, but you minimized the number of overlapping cells
- each call that comes into Life Bank searches for the portable on one system
- the three Meridian Companion systems use different system names
- three systems is the smallest number of Meridian Companion systems required to serve the site
- all of the users do not need to go everywhere
- you kept all of the users in the same area on the same system, except on the twenty-eighth floor where the cafeteria and the lounge are
- you grouped the cells of each system together in the building, but each system has two cells serving the twenty-eighth floor, as shown in Figure 34

Figure 34: Life Bank, 28th floor



High portable count/high cell count problem

Highgrade Oil has a refinery with 760 employees, 650 of whom work in the refinery doing routine maintenance, emergency maintenance, tests and new construction. Usually, you cannot reach these employees until they come in for break, lunch, prearranged meetings or the end of the work day.

The emergency maintenance staff uses two-way radios but it is so busy that they often have to wait their turn to speak.

Emergency maintenance, the medical emergency staff, security and the system managers need total access to the entire site. These departments have a combined staff of 50. Most users work in a department that is responsible for one section of the refinery.

The sales group recommends a Meridian Companion system on the Meridian product line.

Solution

You survey the site using -75 dBm for outdoor locations, but you use -73 dBm for the seven departmental office buildings scattered throughout the site and -70 dBm for offices. You find that the site needs 217 cells.

From the traffic calculations, you find you need 282 Base Stations if you assume that everyone has a desk phone, or 304 Base Stations if you assume everyone does not have a desk phone.

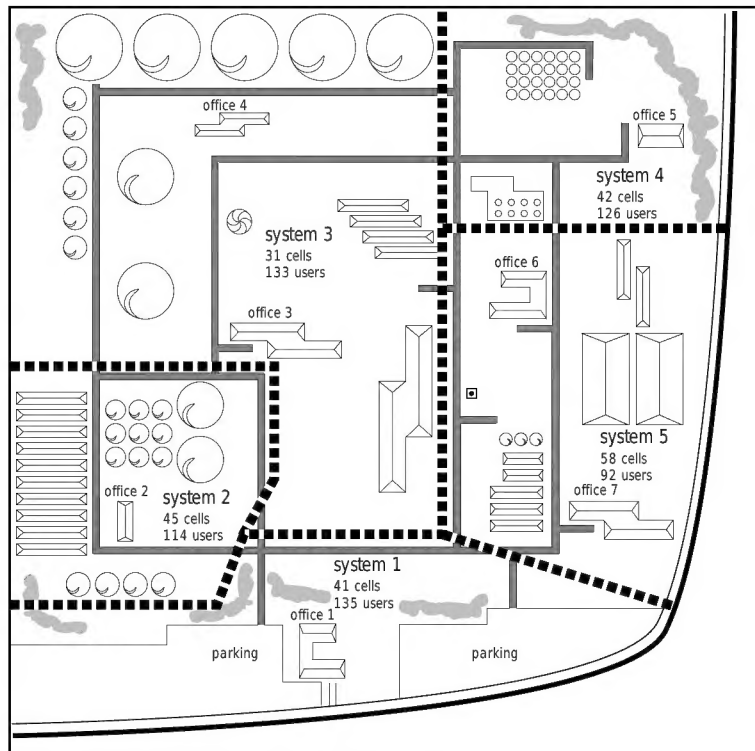
Using the appropriate table in your Companion installation documentation, you find that one Meridian Companion system cannot serve 650 users with 282 Base Stations. The refinery requires five Meridian Companion systems as follows:

- System 1 needs 41 cells for 135 single system users and 50 multi-system users, and 59 Base Stations. The installer can register seven more users to this system.
- System 2 needs 45 cells for 114 single system users and 50 multi-system users, and 62 Base Stations. The installer can register 28 more users to this system.
- System 3 needs 31 cells for 133 single system users and 50 multi-system users, and 48 Base Stations. The installer can register nine more users to this system.
- System 4 needs 42 cells for 126 single system users and 50 multi-system users, and 61 Base Stations. The installer can register 16 more users to this system.
- System 5 needs 58 cells for 92 single system users and 50 multi-system users, and 74 Base Stations. The installer can register 34 additional users to this system.

When determining the number of Base Stations required for each cell for the five Meridian Companion systems, you calculate the anticipated number of portables per cell for the single system users using the number of cells of their particular system. For the 50 multi-system users, you calculate their anticipated number of portables per cell using the total 217 cells. You consider these 50 multi-system users as users without offices.

Figure 35 shows the site with a large number of portables and a large number of cells.

Figure 35: High portable count/high cell count example



Highgrade Oil coverage requirements

- The systems have minimal overlap.

- Except for the 50 multi-system users, each call that comes into Highgrade Oil searches for the portable on one Meridian Companion system. For the 50 multi-system users, an incoming call searches on all five Meridian Companion systems.
- Five Meridian Companion systems is the smallest number of systems required to serve the site.
- All of the users do not need to go everywhere.
- All of the users in the same area are on the same system.
- The cells of each system are grouped together on the site.